

SPLIT FORWARD SURGICAL TEAMS

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Joint Planner

by

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ABSTRACT

SPLIT FORWARD SURGICAL TEAMS, by MAJ Michael A. Ball, 67 pages.

In the last 20 years, the Army's Field and Combat Support Hospitals have found it difficult to deploy rapidly and to keep pace with maneuver forces. The Forward Surgical Team (FST) was the bridge for this gap in capabilities. Until recently, the FST had not been deployed and utilized in combat. With the recent conflicts in Afghanistan and Iraq, FSTs have been extensively utilized. Using the data and experiences from these conflicts, should updates to the doctrine be made? One unexpected outcome from these conflicts was the use of split FSTs in Afghanistan. Using the data from evacuation logs from Afghanistan, the Joint Trauma Center, and the recent experiences of FST staffs the effectiveness of split FSTs was investigated based on the Died of Wounds (DOW) rate and evacuation times. Additionally the personnel, Doctrinal employment, and equipment were investigated to determine if significant changes were needed to employ split FSTs or what would prevent split FSTs being written into doctrine? From the data collected, split FSTs had DOW rates that were lower than the DOW rate at the end of Vietnam, which is considered the standard. As such, the split FSTs in Afghanistan were determined to be effective and the doctrine could be changed with minimal additional cost in equipment. The split FST would give commanders another option to employ FSTs with the risks having been already studied. The benefits of the split FST would be the ability to serve wider areas of coverage with limited resources and possibly the ability to get surgical units on the ground earlier in entry operations due to having smaller transportation requirements.

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ACRONYMS

ATLS	Advance Trauma Life Support
AAR	After Action Review
AMEDD	Army Medical Department
BCT	Brigade Combat Team
BSB	Brigade Support Battalion
CJTF-76	Combined Joint Task Force 76
CSH	Combat Support
CRNA	Certified Registered Nurse Anesthetist
DOW	Died of Wounds
DOTML-PF	Doctrine, Organization, Training, Material, Leadership, Personnel, Facilities
FM	Field Manual
FOB	Forward Operating Base
FSMC	Forward Support Medical Company
FST	Forward Surgical Team
HQ	Headquarters
HMMWV	High Mobility Multipurpose Wheeled Vehicle
KW	Kilowatt
MASH	Mobile Army Surgical Hospital
MTOE	Modification Table of Organization and Equipment
MSC	Medical Service Corps
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom

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CHAPTER 1

INTRODUCTION

Historically warfare has been brutal; it has killed and maimed many soldiers. Modern warfare has a greater capacity to kill and injure soldiers through more advanced technology in weapons systems. Medical care was introduced into warfare to treat, care for, and heal the wounded. Medical care has evolved on the battlefield from doctors volunteering during the Civil War to care for wounded soldiers to medical personnel being paid and highly trained for specific care during the current conflicts. Medicine has also gained in its capacity to treat those wounded in battle through the advancement in medication and equipment.

The U.S. Army considers modern medicine as a part of the reason its soldiers are willing to risk the dangers of the modern battlefield. Soldiers in today's army are aware that if they are injured they will receive very good medical care and have a high likelihood of surviving and recovering from the wounds sustained on the battlefield. Military hospitals were developed in the US Army as far back as the Civil War. Military hospitals that could be set up near the battles and fighting have been the mainstay of military medicine since those early years. In more recent times, these military hospitals have been called field hospitals and combat support hospitals. As medicine has progressed with new technologies, the military has adopted these technologies and used them in the field hospitals and combat support hospitals in order to provide the best care possible to wounded soldiers. These technologies and the requirement for electrical power to run these modern technologies have added to the weight of equipment that has to be moved when a military hospital is relocated to support soldiers. Today U.S. Army

combat support hospitals require external transportation assets to move the complete hospital, the trucks assigned within the hospital can only move part of the hospital. After the hospital is moved, it requires several days to set up the hospital before it is functional. Since the 1980s, the U.S. has been involved in several conflicts that developed rapidly and in a couple that have been fought over large distances at relatively fast paces. The pace in some of these conflicts was such that by the time a combat support hospital was moved and set up in a spot, the combat forces had moved out of the area and the hospital was too far away to provide the care that was needed. The Army has tried to reorganize and develop smaller hospitals that are more flexible and mobile so as to be able to keep pace with the combat forces and to be able to provide the care that wounded soldiers need. This is an ongoing process as the U.S. Army becomes increasingly mobile. Part of the solution was the development of the Forward Surgical Team (FST) to bridge the mobility gap, yet provide modern medical care to wounded soldiers. As part of providing modern medicine on the battlefield, the Army Medical Department (AMEDD) has developed the FST to position the medical care as close as possible to battles. This is so maneuver forces can maintain a high tempo and fluid battle without having to worry about evacuating their wounded large distances to receive care.

This chapter will consider the Doctrine, Organization, Personnel and Equipment of a FST. It will set the background for the study of split FST to determine if doctrine should change to support split FST operations. It will set the stage for the questions that have to be researched in order to answer this primary question. It will set the limits and delimitations of the study.

The “golden hour” is a term in the Army that has come to mean that if a wounded soldier can get definitive medical care within an hour of being wounded, the chances of survival dramatically increase. The “golden hour” is trained at the various training centers when testing a unit’s ability to evacuate casualties. Some training centers grant extensions over one hour for casualties that have had medical treatment from a medic or a battalion aid station along the way. The time extensions are usually dependent on the level of care given. Most training centers stop timing evacuation at the Forward support medical company or BSB medical company because this is where the doctrine would place the FST on the battlefield. Based on the “golden hour” concept, FSTs have been developed and employed forward.

FST Defined

FSTs are twenty man teams that are designed to be collocated with Forward support medical companies (FSMC) or forward medical companies in order to provide emergency surgical capability to a brigade area. The FMSC is the largest medical unit in a BCT. The FSMC provides what is called level II care for the BCT. The increased level of care comes from the laboratory, x-ray, dental and patient holding capabilities of the FSMC. The FSMC is part of the brigade support battalion (BSB). The FST provides life and limb saving surgeries that the patient needs to survive continued evacuation to definitive care, usually provided by a combat support hospital (CSH). The CSH provides level III care for wounded soldiers. This includes surgical care, x-ray, lab, CT scanner, pharmacy, and staffed wards. The concept in the levels of care is that higher the level the greater the capability and the resources needed to care for the wounded. The tiered level system of medical care uses triage to care for the most severe injuries first

and then evacuating to the next level of care. The primary reason for emergency surgeries performed in a FST are for airway management, wound debridement, to stop bleeding, and to stabilize fractures (FM 4-02.25 2003, B1-B10). The types of surgeries performed are thoracic, abdominal, orthopedic and on rare occasion neurosurgery. The FST can conduct two surgeries at the same time, one with each of its 2 operating room tables (FM 4-02.25 2003, 2-3). FSTs are one hundred percent mobile in a single lift with organic assets and can be fully functional in one and a half hours (FM 4-02.25 2003, 3-2). Considerations of employment are that they do not start a surgery unless they can stay at the location until the surgery is completed and the patient could be allowed enough postoperative recovery to survive further evacuation. Another consideration is that the average surgical procedure per patient is 135 minutes and that the FST can only provide eight patients up to six hours of postoperative care (FM 4-02.25 2003, 3-2).

Basis of allocation is one FST per maneuver brigade (FM 4-02.25 2003, 2-2). However, a division will usually only be supported by one to two FSTs for a given time frame due to the limited number of FSTs in the inventory. Since FSTs are only designed for 30 surgeries within a 72-hour period of operation before needing to be re-supplied and re-fit, they are usually attached to the brigades that are expecting the highest number of casualties. When attached to a brigade, they are usually collocated with the forward support medical companies. The FST receives all life support from the BSB medical company including but not limited to food, fuel, security, ammunition, and additional medical supplies. The medical company also provides diagnostic medical capabilities to the FST. The capabilities that a BSB medical company has that the FST does not are: x-ray, basic lab, support with whole blood, patient holding and the ability to coordinate for

evacuation. Normally after the 72 hours of continuous operation, the FST would be de-attached and retrograded for refit and rest prior to being attached to a unit. If this cannot be done because of the tactical situation, then re-supply and reinforcing staff will be sent to the FST.

Due to the mobility and small footprint of the FST, it has been valuable in the recent conflicts OIF and OEF that required rapid movement of combat forces over long distances. combat support hospitals (CSH) are heavy and need external transportation assets to move. Once set up CSH's are slow to move and have difficulty keeping up with maneuver forces since they are only about 35% mobile with organic assets and require up to 89 hours to setup a full hospital (ARTEP-8-855MRI-MTP 2000, 4-39). The FSTs have helped to bridge the gap in medical coverage and provide surgical care forward to allow continued evacuation to slower combat support hospitals (FM 4-02.25 2003, 1-3).

Most of the time, if a FST is not attached to a BCT, it is collocated with a combat support hospital and the staff works as part of the hospital staff. This allows the highly valuable and perishable skills of the surgical staff to be used and maintained.

FSTs are manned with four surgeons. Three are usually general surgeons and one is an orthopedic surgeon. There are two nurse anesthetists, two medical-surgical nurses, and an operating room nurse. There is a Medical Service Corps (MSC) officer who acts as the operations of the FST. The enlisted specialties include: five medics, two of which have additional training as practical nurses. Then there are three operating room specialists (MTOE 2006, 7).

The major pieces of medical equipment in a FST are: two defibrulators, Medical equipment set FST, two vital signs monitors, six ECG monitors, a refrigerator, two field

operating tables and two field sinks. (MTOE 2006, 15-16) The major pieces of support equipment are: a 5 KW generator, twelve night vision goggles, a global positioning system, and six HMMWV with trailers (MTOE 2006, 15-16).

Recently, FSTs have been deployed to Iraq and Afghanistan to support early entry forces and some FSTs have remained in theater to support forces. In both of these conflicts FSTs have been called on for non-doctrinal employment to provide the needed life saving support for U.S. soldiers. This included stand alone employment without medical companies, being split, and being used on aircraft (Peoples 2005, 452). These teams have been successful in these situations and this is a testament to the skills of the individuals and the staffs of the FSTs. Both the Iraq and Afghanistan theaters have been developed with logistics infrastructure supporting the combat units. The combat operations have also changed from mainly maneuver combat to more stability and counter insurgency operations.

It was as part of the stability and counter insurgencies operations that the author deployed to Afghanistan in January 2006 with the 10th Mountain Division as part of the Division surgeon's staff. The theater was developed by the time of this deployment with coalition forces operating out of established forward operating bases (FOB) and establishing new bases when necessary for operations. When the 10th Mountain Division arrived in 2006, they were briefed on the current medical assets and were surprised that the FSTs in the area of operations were split and were not with medical companies. Though most were collocated with aid stations or parts of aid stations. Aid stations or medical platoons are the largest medical unit in a maneuver battalion. The battalion aid station is staffed with one doctor, a physician's assistant and medics. The battalion aid

station is considered a level I facility and is able to provide initial resuscitation and advance trauma life saving (ATLS). None of the FSTs were in close proximity to where air evacuation assets were based. The medical staffs at the division and brigade levels made various recommendations to the command but not many changes were made. There were some professional disagreements on FST employment among the different levels of medical staff. Also, commanders did not want to lose medical assets in their area for a variety of reasons, including: not having enough medical assets to provide coverage on each of the FOBs that troops were located at to the ubiquitous “just in case”.

The maneuver unit separated its medical company and distributed it out to various FOBs along with part of a second medical company to provide broad level I medical coverage to as many FOBs as possible. At this time, ground evacuations between FOBs were not common due to the mountainous terrain and rough road network. If there was a split FST on the FOB, the maneuver unit’s medics would collocate to assist each other.

As the deployment progressed, most levels of command and medical staff became comfortable with the split FSTs and the perceived success that they were having. The Author can only remember two patients not surviving after arriving at split FSTs. One passed away at Landstuhl and the second passed away at the FST due to massive wounds in spite of receiving approximately twenty units of blood.

The maneuver units and coalition units were comfortable with the coverage and medical care that the split FSTs provided. They were comfortable enough that requests were made several times to have up to an additional three split FSTs for various locations in the area of operations and in adjoining areas of operations. Most of these requests

were denied due to the basis of allocation being one FST per BCT and because there was documented failure on the part of the medical system that was in place.

The reason for this study is to determine in an objective way if split FSTs are effective. If split FSTs are effective and can be written into doctrine, then the split FST could help in providing greater amounts of medical coverage; thereby potentially providing surgical coverage for more soldiers in noncontiguous battle fields. Additionally, the split FSTs could possibly provide surgical care earlier in entry operations. This would be feasible as the footprint and cubic feet of the gear being smaller and lighter thereby allowing members of FSTs to be able to deploy sooner, as space is available. The current trend of conflicts is moving away from linear operations and into non-linear, noncontiguous operations. The current CSH is too slow, too large, too logistics dependant and too immobile for today's conflicts with one possible course of action being that the FST and split FSTs provide much of the surgical care in the direct combat area with a CSH or hospital ship providing the next level of care in a nearby country or regions.

In retrospect the split FSTs seemed to have been very successful. The reason for the study of these non-doctrinal split FSTs is to determine if the doctrine needs to be changed to allow or anticipate the splitting of FSTs. The study will look at the DOTML-PF concentrating on Doctrine, Material, Personnel and Facilities. This study will not look at the Leadership aspect. The study will only briefly look at Organization and Training.

Primary Question

To answer the primary question of: Should non-doctrinal splits of forward surgical teams become doctrine? Sub-questions must be addressed and answered first. The primary question leads to additional questions of: If the split FSTs are effective, could the splits be written into doctrine in the future? To be effective, are there requirements in personnel or equipment that are needed for the split to be added to the MTOE, or should supplementary personnel and equipment be noted for the joint staff to have readily available for contingencies that may call for split FSTs?

Secondary Questions

Before any of these questions can be looked at, the study must first look at secondary questions to help answer the primary question. The first of the secondary questions is: Were the split FSTs effective? To determine the effectiveness, the study will look at how many patients died of wounds after arrival at FSTs. Additionally, what was the average time to evacuate the wounded to FSTs? And, was that evacuation time within the “Golden hour?”

To answer the additional questions, the study will look at the split FST and see what equipment, if any, was added to the FSTs. Additionally, what personnel, if any, were added to the FST?

To answer the additional questions, the study will have to determine what changes would have to be made to the MTOE to write the split into doctrine and what changes in current doctrine would have to occur.

In researching the Doctrine the study will have to determine what changes in employment had to be made in these seemingly successful split FSTs. Could these changes result in the perceived effectiveness of the split FST?

Limitations and Delimitations

Limitations of this study will be accessing data stored in the no longer existing CJTF-76 HQ systems. Some of that data may be classified. There is limited information in reference material. Most literature only references that a FST was split and does not concentrate on the operations of a split FST. Most of the information will have to come from interviews of personnel involved in operations with the FSTs.

Delimitations will be data from Feb 06 to Dec 06 from the CJTF –76 and experiences of staff from Jan 06 to the current. This chapter set the stage by introducing the doctrine, organization, personnel and equipment of a FST. It has set the background for the study of split FST to determine if Doctrine should change to support split FST operations. This chapter has laid out the questions that have to be researched to answer the primary question and it sets the limits of the study.

CHAPTER 2

LITERATURE REVIEW

It may be possible to spread surgical assets wider through combat areas by splitting forward surgical teams in half. These smaller teams should be easier to plan into strategic lift for deployments. Before plans to split the forward surgical teams can be made, it must first be determined if non-doctrinal splits of Forward Surgical Teams should become Doctrine so that they can be properly supported. To determine if doctrine should be changed the effectiveness of these split FSTs must be determined. To determine the effectiveness of splits FSTs this study will focus on FSTs that deployed to Iraq and Afghanistan in operations OIF and OEF respectively.

In studying whether the doctrine should be changed, this chapter will review the current literature to determine whether doctrine may allow for split FSTs or whether doctrine needs changing. This Chapter will study the current literature based on the DOTML-PF concept. This chapter is broken into sections and will concentrate on the sections of Doctrine, Organization, Material, Personnel, Training and will take a slight look at the sections of Facilities and Supporting Documents.

Doctrine

FM 4-02.25, *Employment of Forward Surgical Teams* (March 2003) is the document that provides the most information as it outlines the doctrine of the FST. It provides the reasons that FSTs were developed. Historically ten to fifteen percent of wounded soldiers required surgery to control hemorrhaging. These soldiers would die without surgical intervention. FSTs were combined with forward support medical

companies to provide a level II plus medical facility that performs resuscitative surgery to allow the further evacuation of wounded to higher levels of medical care. The manual states that non-linear battlefields and urban battles will increase the need for forward surgical care and flexibility from medical assets. Due to the limited resources and capability, FSTs only conduct surgery on select patients that would not survive further evacuations without resuscitative surgery (FM 4-02.25 2003, iv). The threat of enemy action causing the loss of a FST traditionally increases the farther forward it is employed in linear battles. That risk level was taken into account as the doctrinal location was set at the Brigade Support Area. This area is also able to provide the resources that the FSTs need to operate because it is where the combat brigades' internal logistics hub is based. The FM does not mention splitting the FST for operations. Since this is part of what establishes doctrine for an FST, it is of importance.

The Memorandum for Record by COL Espinosa, *274th Forward surgical Team Deployment and Considerations AAR* (May 2006), the commander of the 274th FST in Iraq during 2006, tells of him only employing half of his FST while deployed. He noted problems with the staff losing skills due to the lack of cases. He suggests that staff be rotated with CSHs to maintain skills if the caseload is low. He also mentions split FSTs in OEF and internal problems due to being split; but, does not expound on this or give any other details. He suggests that FSTs be reconfigured for a wide array of missions: advanced ATLS, split FSTs, to full FST operations in support of BCTs, Military Internal Training Teams (MITT), Provincial Reconstruction Teams (PRTs), and Medical Capability programs (MEDCAPs) (Espinosa 2006, 2-4). This paper and COL Espinosa are very influential in the area of FSTs and in proposing changes to make FSTs modular.

The Army Medical Department recently held a conference on FSTs and used COL Espinosa's recommendations from his experiences in OIF as the basis of the conference. Resulting from the conference, a team had been given the task of investigating possible changes to FSTs stemming from COL Espinosa's recommendations. The changes he suggested are mainly to the employment of FSTs with few other changes to the other DOTMLPF areas. One of the few changes within the DOTMLPF included a change to personnel. This change included replacing one of the general surgeons with a physician's assistant. Within the area of organization, he suggested packing FSTs in a modular fashion to allow for the incremental yet rapid employment. In the area of training, he suggested using the FST for training and certification of medical personnel (Espinosa 2006, 4).

The 82nd Airborne Trip Report by CSM Mathsen and MSG Sladky (Jun 2004) states a staff from a FST was proud of the accomplishments while split and thought that all FSTs should be able to do the same. The paper does not go into detail on this subject. This article adds to the split FST theory but does not describe the reasons for the split FSTs.

The Memorandum For Record by MAJ Denkins (Dec 2005), an Army Nurse with the 67th FST, states that FSTs should be collocated with the CSHs in stability operations due to the lack of surgical patients and the loss of skill of the staff. Since both OIF and OEF fall into the stability type operation this article has a bearing on the subject. It however does not mention split FSTs. This article is typical of the majority of articles about FSTs coming from OIF. The majority of articles express the opinion that FSTs

should not be used in Stability Operations due to the lack of surgical cases, which cause a loss of skills in the FST staff.

The memorandum for record by COL Polo (Nov 2005), a Surgeon in the 274th FST during 2005 in OIF, states that with short evacuation times, the use of FSTs is not justified and could result in higher mortality rates. He infers that the use of a split FST to provide advanced –Advanced Trauma Life Support (ATLS) without surgical assets would be better than a FST due to the reduced equipment and power requirements (Polo 2005). He also infers that the FST was deployed without a BSB medical company. This article reinforces the concept of not needing FSTs in stability operations. This article introduces the idea of using split FSTs as advanced -ATLS type units to augment areas of the battlefield or medical units. This memorandum was possibly used as a reference for COL Espinosa AAR.

The research paper *The Forward Surgical Team Experience in Contemporary Operations: Impetus For Change* by MAJ Fischer (2003) gave three points that are valid for this study: First, that FSTs need augmentation if deployed non-doctrinally. This augmentation includes x-ray and lab equipment and the personnel to utilize the equipment, along with a physician's assistant when not deployed with a medical company (Fischer 2003, 10). Second, that changes to doctrine impact other DTLOMS areas. Here MAJ Fischer states that if equipment and personnel are added, then the rapid mobility is reduced as generators and vehicles are needed to support the additional equipment (Fischer 2003, 11). Third, that the FST is designed for specific types or classification codes of patients and that FSTs in OEF are reporting only 43% of the patients meeting these codes. This means that almost 60% of the patients did not fall into

the 10-15% of casualties that could not survive further evacuation, which is the primary mission of the FST (Fischer 2003, 5). This could possibly mean that the FSTs are filling a role that is larger than the one under which they were formed. This paper does make a case for several changes in FSTs to make them more efficient and to deal with non-doctrinal employment that has been experienced by FSTs in OEF.

The Point Paper Consolidating Medical Assets Optimal Use of Level II and III Assets in OIF-2 by COL Holcomb (Jun 2004) gives information about employment of FSTs in OIF both in the initial entry and during stabilization operations. COL Holcomb disagrees with the “golden hour” theory. He gave the example of a US civilian trauma system where some patients are air lifted 2 hours to trauma centers and this is acceptable in the US, so it should be acceptable for the armed services. He presents that the FSTs were useful in the initial entry operations but are a waste of resources in stability operations except to split them to provide advanced -ATLS without surgical capabilities for short periods of time. This article once again reinforces the concept of not needing FSTs in stability operations based on experiences in OIF. But again, there is the mention of splitting the FST for an advanced ATLS augmentation for short periods of time (Holcomb 2004, 1). This article is the best-written argumentative essay on not needing FSTs in stability operations. It gives comparisons and examples that support the concept of not needing FSTs for stability operations and is a leading article in this area.

The article *Combat Casualties in Afghanistan Cared for by a single Forward Surgical Team During the Initial Phases of Operation Enduring Freedom* in military medicine (People 2005) focuses on the type of patients the FST saw and how they were treated. It does discuss that if FSTs are employed non-doctrinally they will need

augmentation in other DTLOMS areas. This article implies split FSTs, but does not detail them in writing. It is a good article for the surgeon that does not have combat experience and wants to know what to expect in patient injuries.

The 274th Forward Surgical Team Experience during Operation Enduring Freedom by LTC Peoples (2005) covers the same time period for the same FST as the article Combat Casualties in Afghanistan Cared for by a single Forward Surgical Team during the initial phases of operation enduring freedom but covers the operational employment in more detail. LTC Peoples describes being the only surgical unit in Afghanistan for much of the deployment. Being the only surgical unit they were asked to do a wide variety of missions. Some of those missions include: being split and operating in different locations; performing surgery in-flight; and augmenting other medical assets that had more casualties than they could handle. This article is written as an account of the events in an effort to educate those that will deploy in the future so that they will be better trained, and equipped if utilized in similar types of combat operations. This is an important document since it is one of the few that describes the employment of a FST in the initial entry of low-intensity conflict (Peoples 2005, 451-452). No opinions are given about the different ways the FST was employed. The reader is led to believe that all the ways the FST were employed were successful. Additionally, the reader is led to believe that if the FST was not used in the various ways that is described in the article that several casualties would have died or had much worse out comes. This article is important in the split FST theory since it details the first FSTs experiences in combat which includes split FSTs. It documents non-doctrinal employment of FSTs during the

first combat deployment of a FST. It also documents what seems to be a successful split of the FST without the traditional BSB medical company.

The Army Forward Surgical Team: update and lessons Learned 1997-2004 by COL Stinger (2006) describes the history and development of FSTs. Starting after Grenada, where Mobile Army Surgical Hospital (MASH) did not get on the ground until four days into the operation. The MASH was the smallest and most mobile hospital in the Army at this time (Stinger 2006, 269). Then to Panama where airborne surgical squads parachuted in but had to wait until aircraft landed with their equipment to conduct surgery. COL Stinger's article states that FSTs should only be split for echeloned movement as a last resort (Stinger 2006, 270). He also recommends that FSTs be moved to a CSH if evacuation to a CSH can be made in less than one hour. COL Stinger recommends that if the surgical caseload is reduced to 15 or less per month that the FST should be moved from the BCT, if this is not possible then the staff should be rotated every four to six months so their skills are not lost (Stinger 2006, 270). This article is a prominent article against the use of split FSTs. It holds a lot of weight in the surgical field and is quoted in several other articles. It mentions OIF but completely leaves out OEF. By ignoring the operations of split FSTs in OEF, it reduces the value of its argument against the split FST. This author has written several articles about FSTs. This article also is in contrast to COL Peoples article about split FSTs.

Organization

FM 4-02.25 *Employment of Forward Surgical Teams* (March 2003) defines the organization and capabilities of the FST as 72 hours of continuous surgery when collocated with a BSB medical company. Its resources can provide up to 30 surgeries

and care for 8 postoperative patients. FSTs can also provide surgical augmentation for Level III hospitals. The FST is 100 percent mobile using its own vehicles. The basis of allocation is one per BCT, except airborne and air assault brigade is two per BCT (FM 4-02.25 2003, 2-2 – 2-3). The FST is dependant on the unit it is attached to for all logistics, power, maintenance, communications, and security. If it is to operate as a stand-alone unit, then the FST must be augmented with assets. The FM states that a level of augmentation is necessary depending on the mission it is given and whether it is acting alone (FM 4-02.25 2003, 2-2 – 2-3).

The Memorandum for Commander 44th Medical Command, Ft Bragg N.C., The Modular Forward Surgical Team-A Discussion for Commanders and Planners by MAJ Remick (Dec 2007) suggests a modular concept for FST, based off the ideas presented by COL Espinoza. This paper presents the idea of a modular FST to support the modular BCT and to adapt to the current battlefield environment. MAJ Remick suggests an ATLS module, a Light Surgical module, a heavy surgical module and air assault or airborne module (Remick, 2007, 2). He suggests that equipment and training be conducted prior to deployment so that FSTs are capable to handle all of these modules prior to deployment. The paper does not examine in detail the equipment or training required for each module, but does explain capability and employment of the different modules. This memorandum is important since it is the most recent document that was found in researching this study involving changes in FSTs and it may show that there is a changing of attitudes in the further development of FSTs and their doctrine and organization.

Material

The 82nd Airborne *Trip Report* by CSM Mathsen and MSG Sladky (Jun 2004) is mainly a collection of medical after action reports (AARs) from units redeploying from OIF and OEF. The report states the need for FSTs to have an autoclave in order to clean surgical instruments and power generators for DRASH tents. While this article is not detailed, it does discuss these two items enough to generate a logical argument for additions of an autoclave and the power generators to the list of equipment that FSTs use.

The article *Combat Casualties in Afghanistan Cared for by a Single Forward Surgical Team During the Initial Phases of Operation Enduring Freedom* (People 2005) in *Military Medicine* talks about the augmentation with additional equipment such as the ultrasound and portable digital x-ray system. These two pieces of equipment saved time for the staff and prevented un-necessary surgeries. The author strongly supports the addition of these pieces of equipment to FSTs. He found these items invaluable in the initial phases of conflict. The author makes a case for the addition of x-ray and ultrasound equipment to the FST as they worked without a BSB medical company that would be able to provide this equipment and capability (People 2005, 457-468). They also worked in a split FST configuration with these additional pieces of equipment. This is the most important article referencing material and equipment since this article describes the first FST in combat since the FST concept came into doctrine.

The Army Forward Surgical Team: update and lessons Learned 1997-2004 by COL Stinger (2006) makes many recommendations for equipment. It recommends the addition of air conditioners due to the two conflicts in the desert in the last 15 years. Additionally he recommends the addition of the ultra-sound to diagnose abdominal

trauma. Other surgical instruments he suggests for FSTs are the Bair Hugger blood warmer, the Brookwalter retractor and the Stryker plus irrigation system along with various surgical supplies (Stinger 2006, 272). No case is made for these instruments or supplies and appears just as a laundry list to add to what the FST should have. While the author is an important figure in writing about FSTs he does not make the case for the materials in this article. Some or all of these materials may be important for the FST; however, this article no more than raises these materials as concerns.

Personnel

The Army Forward Surgical Team: update and lessons Learned 1997-2004 by COL Stinger (2006) makes the recommendation of adding a blood bank specialist to handle blood products and recombinant factor VIIa. Recombinant factor VIIa is a clotting factor that is shelf stable. This is important because most transfusions are fresh packed red blood cells that are lacking platelets. The case is made for the importance of blood and blood products, and the possible need for a blood bank specialist to handle these items (Stinger, 2006, 271). Most of the work described by the blood bank identifier (specialist) can also be done by a lab tech from the BSB medical company.

Facilities

FM 4-02.25 *Employment of Forward Surgical Teams* (March 2003) states the doctrinal requirements for space as less than 1000 square feet, which is the space in one General-Purpose (GP) tent. The FM suggests GP tents, DRASH or Chemical, Biologic, Protective Shelter (CBPS) as available and as the situation dictates. (FM 4-02.25 2003,

4-1 to 4-2). This is the only article that describes the Facilities of a FST. Since it sets the doctrine it is the most important.

Training

The 82nd Airborne *Trip Report* by CSM Mathsen and MSG Sladky (Jun 2004) stated more medics need to be M6 trained to add flexibility and the ability to manage more post –op patients. The M6 is the additional skill identifier to designate a medic as having additional training as a practical nurse.

The article *Combat Casualties in Afghanistan Cared for by a Single Forward Surgical Team During the Initial Phases of Operation Enduring Freedom* (Peoples 2005) in *Military Medicine* recommends that the staff of FSTs be trained to perform trauma resuscitation which is the primary purpose of the FST, care for traumatic extremities wounds, perform wound exploration, to control bleeding, perform vascular repair, to perform care for amputations, and use of external fixators. (Peoples 2005, 467). These are not beyond the expected norm of surgical procedures for the FST. This was the first report from a FST to see major combat operation since the FST had come into being. This article reinforces the training that the staffs of FSTs are supposed to receive.

Supporting Documents

The Unit Pre-mobilization Posture article talks about the 909th FST trying to mobilize. Many of the points made are regarding the lack of equipment and training, and soldier deployment issues. The staff of a FST writes this article, however, it seems to detail command failures in training, equipment accountability and soldier readiness. These failures seem to be at the unit level in the chain of command. This article is not of

much use to the current research other than identifying what not to do in a FST prior to a deployment into combat.

The *Understanding Combat Casualty Care Statistics* by Dr John Holcomb (2006) compares Died of Wounds rates and Killed In Action (KIA) rates of OIF and OEF to previous conflicts and finds a decrease in these rates but also goes into detail on how to calculate those rates which is helpful for this paper. The formula used for Died Of Wounds (DOW) is the number died after reaching a MTF divided by the number Wounded In Action (WIA) minus the number returned to duty in 72 hours (Holcomb 2006, 398). The article also lists the Vietnam DOW rate as ranging from 6.1% in 1965 to 2.4% in 1971 (Holcomb 2006, 399). This article is important for this research study because it details how to calculate DOW rate. The formula set in this article is the same that will be used in this study. Additionally, it sets the standard for DOW as those at the end of the Vietnam conflict as the standard to achieve or beat to demonstrate/prove the standard of care and medical system are effective.

Saving Lives Up Front, Forward Resuscitative Surgery (Gillingham 2006) talks about the experience of Navy forward resuscitative surgery teams and shock trauma platoons in initial phases of Iraq. The article underlines the need for forward resuscitative surgery within the first 30-60 minutes of being wounded. It references Naval Health Research Center studies that show dramatic increases in survival of patients when they received surgical care for trauma injuries within the first 60 minutes of the injury, (Gillingham 2006, 4). This article is in direct opposition to COL Holcomb's paper *The Point Paper Consolidating Medical Assets Optimal Use of Level II and III Assets in OIF-2* by COL Holcomb (Jun 2004) on the "golden hour" concept. This paper

is more scientific in its presentation of this point about the time period between injury and care giving it more credibility.

Conclusion

This chapter reviewed the literature about FSTs to gain insight into the effectiveness of split FSTs. The chapter reviewed the literature based on the DOTMLPF concept with concentration on the sections of Doctrine, Organization, Material, Personnel, and Training. It also looked at the sections of Facilities and Supporting Documents. There were no specific articles found specifically about split FSTs. There were several articles that mentioned split FSTs or had opinions about split FSTs, this includes two articles about the first FST deployed in combat in OEF. This FST was split during its' deployment. One of the articles detailed the experiences and employment of the unit without injecting much opinion. There were also articles that expressed negative opinions about use of FSTs in stability operations coming mainly out of combat experiences from OIF. Other than the articles on the 274th FST in OEF, there is a lack of literature about split FSTs.

CHAPTER 3

RESEARCH METHODOLOGY

This chapter lays out the methods used to answer the question “Should split FSTs become Doctrine?” and the supporting questions. The previous chapter reviewed the literature available at the time and established that little has been written about split FSTs despite their frequent use in OEF and some use in OIF. Few of the lessons of split FSTs have been analyzed and published in the Army medical community in an effort to better prepare and support maneuver forces in future conflicts. The literature review picks up a mixed under tone of opinions about split FSTs. There are even some opinions written and published about splitting FSTs, but very little is written analyzing events with theories on ways to improve the performance of FSTs in support of combat forces. In an attempt to analyze one segment of FST employment in combat this paper is focusing on the possible use of split FSTs. It is also looking at whether the doctrine should support split FSTs. This chapter will present the way each question relating to this primary focus was researched and answered.

Questions

The Primary question is “Should split FSTs become Doctrine?” To answer this question, secondary questions were developed which are: “Are split FSTs effective?” and “Could split FSTs be written into doctrine?” Since these are also broad questions, these were further broken into tertiary questions. To support the question of “are Split FSTs effective” the following questions were addressed:

1. What was the died of wounds (DOW) rate for split FSTs?

2. What was the Evacuation time to Split FSTs?

To support the question of could split FSTs be written into doctrine? The following questions were addressed:

1. What additional personnel did the split FST receive for their staff?
2. What additional equipment did the split FST receive in order to do their mission?
3. What, other changes in employment of split FST were used?
4. What is the cost of a split FST?

Lines of research

Of the two secondary questions, the question of the effectiveness was considered the more important of the two questions. To research this series of questions addressing the effectiveness of the split FSTs and answer both the sub-questions, two lines of research were used. The first line of research extracted data from unclassified medical evacuation and treatment records from Combined Joint Task Force 76 (CJTF-76) in OEF for the time period of Jun 06- Dec 06. From these records a DOW rate and an average evacuation time were calculated. The died of wounds (DOW) rate was calculated by the number of patients of urgent and urgent surgical patients that died after being admitted to split FSTs divided by the number of urgent and urgent surgical patients admitted to split FSTs. This was expressed as a percentage. Since the saving of life and limb is the primary job of the FST the DOW, rate was considered the most important of sub-questions. The saving of limbs is not broken down into a rate that is historically accepted or is closely tracked by the Army so this was not considered.

To answer the question regarding evacuation times, the same records were used to calculate an average evacuation time to FSTs. This time was calculated by taking the time that the request for an air medical evacuation was received to the time the helicopter reported landing at the FST. It was realized that there were time lags from the time of injury to the time that a medical evacuation was requested, but this time could not be accurately accounted for and was noted as not being available. It was additionally noted that due to combat conditions, that the approval sequence for the request could add up to 20 minutes. Enemy activity and terrain that put the aircraft at risk could cause further delays to the take off or landing of medical aircraft.

The reason evacuation times were considered important to the study is that previous research has led to the “Golden Hour” theory. The Army teaches and plans medical support based on this “Golden Hour” theory. Therefore, having resuscitative surgery available within 1 hour for the wounded soldiers was considered to be important. The importance came from the Army’s evacuation time standard of one hour. This was seen as a potential benefit to splitting FSTs, as they could, in theory, provide twice the area coverage as a whole FST working from a single location. The adverse effect to the split is a reduction in surgical capability that would be expected to be expressed in higher DOW rates. The average evacuation time could also have been effected by many factors including but not limited to: placement of FSTs, placement of evacuation assets, weather, terrain, and visibility.

The second line of research involved interviews with: commanders of Split FSTs, commanders of Medical Task Forces, medical planners, and command surgeons that worked with split FSTs. All personnel interviewed consented to the interview via e-mail.

Then a list of questions was sent to the participants. This list is attached as Appendix A.

To determine effectiveness of split FSTs several questions were asked:

1. Were the split FSTs effective?
2. In your time in OEF, how many patients did the FSTs treat?
3. How many patients treated by FSTs did not survive?
4. If the FSTs had not been split, would evacuation times been longer or shorter? In your best estimate by how much would evacuation times have changed?

The answers from the participants were analyzed at several levels. The first level was the face value of the participants' answers. Then the answers to the more objective questions were analyzed to determine if the questions that requested an opinion were different from the more objective analysis of other questions. An example is when a Commander said that his split FSTs were not effective but then also said that they had a no deaths at his FST. With this information, the commander would have a DOW rate of zero. A DOW rate of zero would support an effective split of a FST by the design of this study. Additionally, the answers to the other questions were analyzed to determine the reason for this commander's opinion.

The second series of questions was to support the secondary questions of "could split FSTs be written into doctrine?" are considered of secondary importance to the effectiveness questions. These questions determine if additional resources or different ways of employment may have had a bearing on the effectiveness and if they are needed due to the split and what was the cost of those additional resources. Additionally, could the split FSTs be easily supported by doctrine? The primary method of research was

through interviews. The secondary method was through the literature review that had a few articles that mention some of these questions. The types of questions include:

1. What Resources (in personnel and equipment) were added to enhance the capabilities of the FSTs, if any?
2. What is the cost of additional equipment?
3. Were there any other changes in employment of the FST that differed from doctrine?

The responses to the questions along with the other question were analyzed, as well as the how they were answered to determine if additional equipment, staff or different employment may have had a major bearing on the effectiveness of split FST. Additionally, each of the answers was analyzed to determine if the additions or changes were reasonable within the mission and purpose of FSTs. In other words were these only minor changes that were recommended? Then each change was looked at for what it would cost to implement. This was done as a way to determine if the changes could be made to modified table of organization and Equipment (MTOE) or to the doctrine.

This chapter laid out the methods of research that were used in this study. How the data was collected and analyzed. It also laid out the secondary questions to be answered and how the questions related to the primary question of “Should split FSTs become Doctrine?” The chapter laid out how the answer to each question was determined using the data that was collected. The next chapter will discuss the data that was collected and whether the data collected answered the secondary questions that lead to the primary question and whether it was answered or can be answered.

CHAPTER 4

DATA ANALYSIS

This chapter will present data that was collected to answer the question “Should split FSTs become Doctrine?” and the supporting questions. The previous chapter presented the way each question relating to this primary focus was researched and answered. This chapter will analyze the data that was collected using the methods that chapter 3 presented. This chapter analyzes the data collected by the CJTF-76 surgeon’s staff from Feb 2006 to Dec 2006. It also analyzes the answers to the questions from the interviews that were conducted with the various commanders and staffs that have worked with split FSTs. Using the data that was collected and the methods presented in chapter 3 this chapter will answer the questions that support the primary research question of “Should split FSTs become Doctrine?”

The data pulled from the CJTF-76 records from between Feb 2006 and Dec 2006 had only 3 months of data points to gather evacuation times. These three months were OCT to Dec 2006. The times were only pulled for the missions that had a patient classified as urgent or urgent surgical; the two most serious classifications of patients and the proper categories to receive care at a FST. The evacuation time is the time from the receipt of the request, to the mission complete time taken for each of 86 missions during those three months. These were only evacuation requests; no patient transfers from one medical facility to a higher medical facility were included. This total time was 9,593 minutes. Divided by the 86 missions resulted in an average time of 112 minutes per mission or one hour and 52 minutes. This far exceeded the standard of one hour. So the

question of whether the split FSTs provided surgical care within the one-hour time frame was answered as No by this data. The next area to be analyzed was the DOW rate.

The DOW was noted at the end of the mission description. For most of the mission logs, the time and location of death is not noted, and in looking back at the records, it is difficult to determine if the patient made it through the evacuation to reach the medical facility or died in route. Since this log was annotated by the Officer or NCO on duty at the time of the evacuation it is subject to error. Errors could include as the Duty Officer not being informed that the patient died, failing to annotate the death, and staff focusing on multiple missions. Only on one mission is the DOW noted as being at the FST. Seven of the DOW are noted as occurring while enroute to the medical facility. Overall, there were 16 DOW listed in the records from Feb 06 to Dec 06. The worst-case rate for the DOW rate is 1.29% if taken over the 850 urgent and urgent surgical patients that were listed in the records. The best case for the DOW rate is 0.12 % if the only the one DOW entry is taken against the 850 urgent and urgent surgical patients. However, the 0.12% is not realistic and therefore, the worst case data will be taken as the more correct. In addition to evacuation logs, data was obtained from the Joint Trauma Center for the same time period. The data that was available had time periods and locations in which data were not available. First, there was no data from two of the five split FST locations for the entire time period. Other periods of time in which data was not available includes five months between Feb 06 and Dec 06. For two months, at least one of the remaining three split FST locations did not have data available. From the data available, there were a total of eight DOW from 279 patients treated, for a DOW rate of 2.87%. Of the eight DOW, log notes of four of these patients could be matched. These

notes show that none of the four went into surgery and that one was “down,” assumed to mean without a pulse for 30 minutes prior to arriving at the FST. As with any study the data is only as accurate as the person recording the information. With the data available from the Joint Trauma Center and from the evacuation logs, the true DOW rate is somewhere between 1.29% and 2.87%. These are both good to very good rates when compared with the rates of World War II of 3.5% and Vietnam with a 3.2% (Holcomb 2006, 399). The rates for the Feb 06 and Dec 06 time period in Afghanistan are still an improvement over rates of previous conflicts, with the DOW rates at the end of Vietnam being considered the standard to achieve. Except for the Hemcon dressing, the technology from the medic to the FST has not changed significantly. Because of this, the DOW rate at the end of Vietnam is considered a good standard to measure against. The DOW rate for World War II and Vietnam only considered US service members. The data being studied includes not only U.S. Service members but also anyone meeting the criteria to be treated in a US medical facility. This includes the Afghan National Army, other allies, civilians and enemy injured. This expanded population was kept in the data pool for several reasons. These reasons include: having more data points for a more scientifically significant study; showing data that is closer to the real load that the US Armed Forces medical system is handling; and to reduce the usefulness of this study to those that would try to use it against the U.S. Armed Forces. Using this data, the DOW rate has improved since Vietnam; which is a positive note for the split FST.

Table 1. Summary of CJTF-76 Medical Evacuation 2006

Month	Missions	Missions Canceled	Urgent	Total Patients
FEB	80	18	23	26
MAR	97	14	43	57
APR	150	25	53	74
MAY	139	33	67	93
JUN	170	30	73	128
JUL	189	20	88	156
AUG	107	9	43	73
SEP	69	3	32	53
OCT	92	6	44	83
NOV	83	12	37	88
DEC	32	3	16	19
Total	1208	173	519	850

Source: Data from CJTF-76 Medical Evacuation logs 2006.

- Missions are the number of Medical evacuation missions requested.
- Urgent is the number of missions that had a patient classified as urgent or urgent surgical and were not patient transfers from one medical facility to other.
- Total patients are the number of patients that were flown on the urgent missions not all were classified as urgent or urgent surgical.

Table 2. Summary of CJTF-76 Evacuations to FSTs

Month	Missions to FSTs	Patients Evac FST	DOW
FEB	8	10	0
MAR	22	25	1 enroute, 2
APR	29	37	0
MAY	26	30	0
JUN	27	47	5 enroute
JUL	37	68	1 at FST
AUG	19	33	2
SEP	11	27	0
OCT	20	41	2
NOV	12	19	2 enroute, 1
DEC	6	11	0
Total	217	348	16 DOW

Source: Data from CJTF-76 Medical Evacuation logs 2006.

- Missions to FST were the number of missions with urgent patients flown to split FSTs.
- Patients Evac FST was the total number of patients flown to split FSTs on missions with urgent patients.
- DOW is the number of patients that were recorded as died in association with any of the Medical Evacuation missions. If the log noted where the death occurred it is annotated in the summary.

Table 3. Joint Trauma Board DOW Summary 2006

Month	Split FST 1	Split FST 2	Split FST 3	Combined Reports
JAN				
FEB				
MAR				0/16
APR				
MAY				0/15
JUN				
JUL				
AUG	1/32	0/31		
SEP	3/56	1/23	1/28	
OCT	1/36	0/20		
NOV				1/16
DEC				0/6
Sub Total	5/124	1/74	1/28	1/53
Total				8/278
DOW Rate				2.87%

Source: Data provided from the Joint Trauma Board, George Castanzo Joint Theater Trauma System.

- Combined reports show that the data was compiled and could not be attributed to certain locations.
- The fraction is the number of patients that died over the number Surgical patients treated.

From those interviewed, all agreed that the Split FSTs under their command or purview were effective. LTC Nessen also agreed that both halves of his FST were effective on the tactical level but he disagreed on a strategic level, this will be further discussed on DOW rates for the interviews.

For the time period covered from Feb 06 to Dec 06, the commanders said that the split FST had a zero percent DOW rate for soldiers. But that for local nationals it was much harder to determine and track DOW, since follow up care differed greatly depending on the person and location that the person was at. LTC Nesson, who was in command of split FSTs at a different time frame from the above commanders, quoted his DOW rate at 2.38% with over 630 trauma patients being treated (Nesson 2007). However, he quoted the Joint Trauma Coordinator Afghanistan for an overall DOW rate of 4.9% for the conflict in Afghanistan (Nesson 2007). It is for this reason that LTC Nesson does not think Split FSTs are effective at the Strategic level (Nesson 2007).

For the question about evacuation times, all commanders and staff agree that FSTs have been split to decrease the evacuation times. There is disagreement as to whether the split FST, make a difference in the survival of the wounded. LTC Nesson does not think that one of his split FSTs would have made a difference based on the short additional time to the next higher medical facility that was an adhoc CSH (Nesson 2007). However, he thinks that the split FSTs are “necessary to cover a gap or lack in MEDEVAC helicopters” (Nesson 2007)). LTC Nesson’s theory was that the split of the FSTs is needed to mitigate the risks due to constraints on available medical assets in Afghanistan at the time (Nesson 2007). LTC Kosmowski the CJTF-76 Surgeon quoted an average evacuation time as 2 hours and 3 minutes for the time period of Jan 06 to Jan 07 (Kosmowski 2007). This is within 11 minutes of the average evacuation time calculated from the urgent and urgent surgical evacuations from the data points recovered for the same time period Oct 06 to Dec 06. The interviews confirm that the evacuation times exceed the one hour standard. However, it can be inferred from the interviews that

without the FSTs being split, that the average evacuation times would have increased.

Without data before and after splitting FSTs the amount of time saved is speculation and has to rely on the professional opinions of the medical commanders and staff involved in the operations.

In answering the secondary question of whether split FSTs could be written into doctrine, the question of what additional personnel split FSTs were supplemented with was asked during the interviews. The answers varied. From no additional personnel added to personnel were added as needed to meet the circumstances. From all those interviewed, none quoted any type of specialties that were assigned or attached to the FSTs for the time period that they were involved with the split FSTs. Due to this, it is assumed that no additional personnel were assigned or attached to the Split FSTs to make them more effective. Personnel added to the FSTs were for the events called mass casualties, which means that the number and type of casualties was greater than the capabilities of the medical facility. On two occasions, a medical facility determined that they had a mass casualties situation and additional medical personnel and supplies were flown to the medical facility for a few hours to provide additional support and provide additional capability to relieve the medical facility. There were a lot of recommended additions or supplements of personnel, if FSTs are to be split. One interviewee recommended emergency physicians to relieve the surgeons of primary care duties that many FSTs end up doing since many times they were not located with a medical company, which would have had the personnel to perform that mission. Additional recommendations were for the addition of surgeons and nurse anesthetist (CRNA). These recommendations from this interviewee seemed to be more on a case-by-case basis

dependant upon the situation. Another interviewee would have liked an additional orthopedic surgeon since there is only one in a FST and 3 general surgeons so that both of parts of his split FST could have an orthopedic surgeon. The commander made an inference to the need for lab and x-ray technicians to operate additional equipment that they had at their site since he was not collocated with a medical company that would have had those specialties. Basically, no additional personnel were used to supplement split FSTs on a permanent basis between Feb 06 and Dec 06, though the commanders and some staff recommended augmentation depending on the employment of the FST. This leads to the next question about additional equipment at the split FSTs.

Each interviewee was asked what additional resources that they knew that the split FST had been given. All responded that they knew of split FSTs being issued the following additional equipment: digital x-ray, C arm fluoroscope, and Narkomed anesthesia machines. Other additional equipment mentioned but not unanimously reported by the interviewees were: sonisites, I-stat lab analyzers, Citrate bags for whole blood collection, Baer hugger fluid warming and infusion equipment, portable oxygen generators, and Fresh Frozen plasma. While not all interviewees reported these items, many items were available or in use with the different split FSTs that the interviewees worked with. The second list was not mentioned unanimously this may mean the items were either not important to the person or the person had forgotten about the items. The infusion equipment and portable oxygen generators are becoming a “standard supplemental issue” for all FSTs to the point that it is in the process of becoming part of the MTOE. The infusion equipment and the anesthesia equipment are highly requested by the members of FSTs as these items are similar to what they use in operating rooms

while not deployed. These items provide better control for anesthesia or in the case of the infusion machine; they warm and infuse much larger amounts of fluid than the previously approved equipment. The problem with this equipment is that it has not been tested for ruggedness or durability in unimproved settings, which the approved MTOE equipment has been tested for durability and ruggedness. Additionally, the approved equipment was compatible with the other deployable medical equipment, which has been developed to be durable, light and compact. The testing process is time consuming, and once tested and approved, the equipment is commonly no longer considered the newest to be found in use in modern hospitals. The answer to the additional equipment question is, yes. All FSTs were supplemented with additional equipment. Most of the equipment was necessary due to the employment of the FSTs without medical companies that would provide like capability. Additionally, further equipment was reported to supplement the split FST to provide the most modern capabilities. The cost of the equipment is also considered. The cost of the digital x-ray system is \$150,000. The cost of the C-arm flourscope is \$33,374.36 (USAMMA 2008, LIN x90968). The cost of the Narkomed anesthesia machine is \$7,995.00 (Med outlet 2008, NARKOMED 4). The cost of the Sonosite is \$10,000. The cost of the I-stat lab analyzer is \$12,341.92 (USAMMA 2008, UA 263B). The total cost of the additional equipment is \$ 213,711.38.28. This compares to the total cost of equipment of a FST \$583,296.70 (USAMMA 2008, UA 267B).

The last question supporting the writing of split FSTs into doctrine was: What, if any, other changes in employment of split FST were used? The answer from a majority of those interviewed was that the FSTs and split FSTs were used alone. They were not doctrinally collocated with medical companies. Sometimes they were collocated with a

Battalion aid station and sometimes they were just on a forward operating base with other support elements. This is important because FSTs depend on the medical company for diagnostic capabilities of lab and x-ray. The medical company provides the capabilities along with the trained personnel and support for these tools. It is because of this change in employment that the x-ray, C-arm, and I-stat had become necessary equipment augmentations so that the FST could have the minimal diagnostic equipment to prevent unnecessary surgeries. This method of employment has also caused a request by some for the need for laboratory and x-ray technicians. Besides the diagnostic capabilities that the medical company provided they also provide primary care. Again this is a reason that some of those interviewed requested an ER physician, so that the surgeons could concentrate on surgery while the ER physician could take care of other injuries, illnesses and up through resuscitation of the more seriously injured. One split FST had seen over 500 primary care or what the Army terms “sick call” type of patients on its tour (Nesson 2007). The last thing that the medical company provides that was inferred by a couple of those interviewed was patient holding capability. While it is not an ICU, it has trained medical staff that can care for stable patients. This benefits the FST in providing or assisting in postoperative care to patients waiting on further evacuation. This frees up the FST staff for their primary job, which is emergency surgery. The answer to the question is yes. FSTs were employed in other non-doctrinal ways, which necessitated additional equipment and possible augmentation of trained personnel.

Other feed back from the interviews on employment of FSTs is that in OIF, FSTs were frequently overflowed to take casualties to more robust Combat Support Hospitals. This caused FSTs to be attached to Combat Support Hospitals so that the staff could

maintain their skills and be utilized. This is something that several articles suggested and was highlighted in the literature review.

One of the commanders of a split FST had interesting comments about how higher staffs saw and treated his split FST. LTC Nesson said that his FST was treated as a mini hospital, having to report bed status daily (Nesson 2007). A bed in a hospital means that there is 24 hour nursing care with a set ratio of nurses per beds and support staff along various types of equipment based on the type of beds. The FST does have a minimal post-operative care capability, that is supplemented when attached with a medical company, but it does not have a hospital bed capability. This is a dangerous path to follow for medical staffs and planners. If a mini hospital is what is wanted, and needed, then a staff analysis of the need should be done and the resources needed should be requested. The Army had a small mobile hospital at one time; it was the Mobile Army Surgical Hospital (MASH). Otherwise, what is supposed to be a minimally staffed operating room will be asked to do what they cannot do, and the medical system will have failures that it should not have.

Another interesting comment that came out of the interviews was that many of the FSTs are in hardstand buildings or in temporary buildings that have been built since the US involvement in the theaters. The buildings are wired and powered by centralized power source that provide to the base. The hardstand and temporary buildings with centralized power mean that the FSTs can use more delicate medical equipment that would not do well in austere dusty, wet, less controlled environments that the standard tents of a FST would provide.

Other questions to those interviewed included, whether the interviewee would use split FSTs again and under what conditions? The responses were split and polar between yes, they would use split FSTs again under the right conditions, and no, never. Those that said yes were primarily high-level medical commanders and Command surgeons. They thought the split FST worked very well in low intensity conflicts within established theaters; meaning areas where the supply and support infrastructure were in place and running. With low intensity meaning, that only a few casualties at a time were being produced. In such a conflict, there may not be large number of US troops in any one location or in the theater. The troops may be spread out into smaller elements than in higher intensity conflicts and may not be supported by a large medical footprint. It is in this type of situation that these interviewees recommended split FSTs, where the split FST could be positioned closer to the soldiers to provide emergency surgery for the injured soldiers since the split, theoretically, provides twice the number of surgical units to support the troops.

Those opposed to split FSTs tended to be commanders of FSTs. These commanders thought that FSTs were already a minimal surgical capability that was not designed to be split. The FST was to be a bridge between fast moving combat forces and slow moving CSHs (Nesson 2007). Tailoring a CSH would be a better answer for the current mission due to the fact that FSTs had higher DOW rates in OIF I than CSHs because CSHs have greater capabilities to treat patients (Nesson 2007). Those stating they would never use a split FST felt that the FST should not be used after initial entry or after fast and far moving combat operations have ended, and that CSHs should be in place to cover areas of operations and provide trauma care.

This chapter presented the data and how it related to and answered the questions upon which this study was conducted. It found that the DOW rate for the time period studied was lower than Vietnam, which is considered a success. It found that the evacuation times averaged almost two hours; which did not meet the standard of one hour, but that the splitting of FSTs was thought to keep the average evacuation time lower than what it would be without splitting the FSTs. It found that split FSTs did not use additional personnel, but that commanders and some staff think it would help their effectiveness. Split FST has received additional equipment in order to do their mission. Much of the additional equipment was necessitated by other changes in employment. The biggest change in employment is not being collocated with medical companies.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Introduction

This study was conducted to determine if split FSTs should become Doctrine. To conduct this study two secondary questions were posed. The first being, Are split FSTs effective? And the second, Can split FSTs be written into doctrine. These two questions were further broken into tertiary questions for focus on the study. Chapter four answered the questions within the limitations of the study. This chapter will interrupt the results of the questions asked and form conclusions from the data. This chapter will be broken into three parts: the Interpretation of the findings, the Recommendations, and the Summary. The Interpretation of the findings will determine what the results mean, what the implications are and discuss unexpected findings. The Recommendations section will make suggestions and recommendations for action and for the need for further study.

In Chapter 4, the tertiary questions were answered that support each of the secondary questions, which in turn should answer the primary question. Starting with the most important of the secondary questions are split FSTs effective? The two tertiary questions were answered. The first question being, what was the died of wounds rate for split FSTs? The study found that the DOW rate for split FSTs was between 1.7% and 2.8%; which was an improvement over the DOW rate at the end of Vietnam, which was 3.2% (Holcomb 2006, 399). The next tertiary question supporting the effectiveness of split FSTs was, what was the evacuation time to split FSTs? The study found that the average evacuation time was 1 hour and 52 minutes. This does not meet the standard of reaching resuscitative surgery within one hour. However, most of the medical planners

and commanders agree that without the FSTs being split that the average evacuation time would have been longer. These two questions answered the secondary question of, Are split FSTs effective? The answer is a qualified yes. With other areas requiring further study including the effect of long evacuation times on DOW rate and how evacuation times could be reduced. Under the circumstances found by the U.S. Armed forces that operated under these conditions in Afghanistan from January 2006 to December 2006, this study found that the Split FSTs were effective.

The next set of questions supported the secondary question; could split FSTs be written into doctrine? Three tertiary questions needed to be answered. The first, what additional personnel did the split FST receive for their staff? The answer is none. Other than one or two MASCAL events, the split FST received no additional augmentation to their surgical staffs. They did collocate with battalion aid stations when possible. This benefited both medical units when this was done. The next question, what additional equipment did the split FST receive in order to do their mission? The answer is that the split FSTs received c-arm fluoroscopes, digital x-ray systems, Narkomed anesthesia machines, sonisites, and I stat lab analyzers. This equipment had a total cost of \$213,711.38.28. Three of these five pieces of equipment were needed since the split FST was not located with a medical company. The last of the tertiary questions was, what, if any, other changes in employment of split FST were used? The answer is, that they were not collocated with medical companies. Compared to the recommended doctrine of collocating FSTs with brigade level medical companies. In this study, the split FSTs were sometimes collocated with battalion aid stations. Most were located in temporary buildings and were supported with centralized power. These questions lead to

answering the question, could split FSTs be written into doctrine? The answer is yes with several qualifiers. A qualifier being, if split FSTs are not collocated with a medical company, then additional equipment will be needed by the split FSTs. All life support including food, power, water, security and a facility will have to be provided. This leads to the primary question, should split FSTs be written into Doctrine? Prior to making any recommendation, the meaning of the results and the implications should be discussed.

Interpretation of results

Under the effectiveness of the split FST the DOW rate was found to be between 1.7% and 2.8%. This is lower than the rate at the end of Vietnam, which was 3.2% (Holcomb 2006, 399). The split FSTs would have to be considered effective in doing their primary job of resuscitative surgery. If the split FSTs were not effective, the DOW rate would be expected to be higher from the lack of sufficient staff, equipment or specialties. As a unit is reduced in size, its ability to conduct its mission efficiently is reduced at a certain point. There is a point at which reducing a unit's size can cause it to no longer be able to do its mission. From the data collected, the split FST is not at the point where it is no longer able to do its mission under the conditions that were found in Afghanistan. However, the split FST is reduced to the point where there is no depth in its staff. It is to the point where the loss of one person in the split FST could cause mission failure. An Example is the CRNA. The loss of a CRNA in a split FST would mean there would be no anesthesia available for patients and the split FST would not be able to continue to do surgeries until the CRNA is replaced.

The next area to be considered was the evacuation time to the split FST. While the average time was one hour and 52 minutes, all those interviewed agreed that the

average evacuation time would have increased if the FST were not split. Evacuation time is an important area that is commonly tracked as a measure of effectiveness of medical units or the medical plan. One of the reasons to split FSTs would be to provide areas of greater coverage and have shorter evacuation times. Negative outcomes to the long evacuation times would affect the DOW rate by causing it to increase. While the average evacuation times were greater than the one-hour standard with split FSTs, the interviews strongly suggest that splitting the FST only had a positive effect on the evacuation time. There are no control numbers (before and after) to show this positive effect, there are only the professional opinions of those interviewed. The results of the data could mean that there is not enough evacuation assets distributed through out the region that the US medical forces cover or that the processes and procedures for air evacuation are long. Additionally, it could mean that there are not enough FSTs and CSHs for the region. All of these possibilities would require more medical and/or aviation units as a solution to reduce the evacuation times.

In compiling the data for both of these tertiary questions, the answer to the answer to the question of whether split FSTs are effective has to be yes. They are able to continue to do their primary mission of performing resuscitative surgery. The fact that they are able to split and set up in different locations allows them to be placed to provide an area of greater coverage than a single FST. This in turn should reduce the evacuation times for patients.

In answering the secondary question of could split FSTs be written into doctrine, three tertiary questions were proposed. The first, what additional personnel did the split FST receive for their staff? This answer was none. For split FSTs there is not a

requirement for additional personnel for the FST to be effective. As discussed earlier, one of the risks of the split is that there is no depth in a split FST. This is something that a commander must understand prior to making the decision to split a FST and the commander must have a plan to mitigate the loss of personnel at a split FST.

Theoretically, the loss of one person at each split FST location could make them unable to do their mission, while, the same loss at a complete FST might only reduce capability.

The next of the tertiary questions is, what additional equipment did the split FST receive in order to do their mission? The answer, they received c-arm fluoroscopes, digital x-ray systems, Narkomed anesthesia machines, sonisites, and I stat lab analyzers. Three of the five pieces of equipment are due more to the lack of being collocated with a brigade level medical company that has C-arm, a digital x-ray system, and I stat lab analyzers. The cost of the equipment associated with employing the FST without a medical company is \$195716.28. The sonisites and anesthesia machine can neither be attributed to being needed due to the split nor ruled out from the data that was collected. The author attributed these two pieces of equipment to professional medical staffs that wished to provide the best diagnostic and surgical care to patients as is possible. The cost of these up grades in equipment is \$17,995.00. The implication of this data is that when splitting FSTs, additional augmentation of equipment will be needed for the split FST to be able to effectively complete their mission.

The last of the tertiary questions was, what if any other changes in employment of split FSTs were used? The answer is: they were not collocated with medical companies. They were sometimes collocated with battalion aid stations. Most were located in temporary buildings and were supported with centralized power. Not being collocated

with a BSB medical company caused the need for some of the additional equipment. This additional equipment caused a need for additional training of the members of the FST. The medical company has trained personnel for the equipment and would operate the equipment in support of the FST when collocated with the medical company. Without these trained personnel, the staff of the FST needed training on how to operate the additional equipment for it to be of use and so that the staff could maintain the equipment in good working order. This study did not investigate whether the personnel in the split FSTs received training on any of the equipment that they received. The use of temporary buildings and centralized power is expected the longer a unit is in one location. Having a building and electricity improved the conditions that the staff worked under and reduced the workload of having to maintain tents and power generation equipment. This allowed the FST staff to focus on providing medical care. Having these resources provided a reduced workload on the staff of split FSTs. A full FST would be able to provide a person to do maintenance on tents, vehicles and other minimal life support areas without seriously impacting the primary mission. While a split FST staff would have a hard time keeping up with medical care, preparation, and clean up after surgery, plus the additional maintenance on tents and power generation equipment that is required to keep a FST running.

These tertiary questions support the question of could split FSTs be written into doctrine. The answer is yes, but with caveats. The commander that splits FSTs must know that there are risks, which include: lack of depth in personnel, the need for additional equipment and training on the equipment, and the need for assistance to maintain life support for the FST.

Unexpected findings

The length of the average evacuation time was not expected to be almost double the standard of 1 hour when the died of wound rates were as low as they were. With the average evacuation time being that long it would be expected to have a negative effect on the DOW rate. There is not sufficient data in this study to compare the DOW rates of patients with evacuation times of less than one hour to patients with evacuation rates over one hour. Such a study would have to be performed to determine if the lengthy evacuation times affected the DOW rate of split FSTs. Since this study was not set up to differentiate those possibilities, it is possible that a portion of the DOW rate could be attributed to the lengthy evacuation times. It is also possible that the evacuation times had no effect on DOW rates to split FSTs.

Recommendations

Based on this study, a recommendation could be made that the split FST be written into doctrine as one of the possible ways to employ an FST. This study supports the part of the modular concept that divides the surgical capabilities in roughly equal parts. The employment of the FST must match the conditions expected to be found on the ground. This study only recommends the split FST in situations similar to those found in Afghanistan. Those conditions are low intensity conflict with a mature theater. Other situations where the split FST may be considered would be in early entry operations where transportation is limited in the combat area thus delaying a CSH or when a full FST cannot enter into the area. The reason for the split would be to move the surgical assets higher on the transportation list if casualties are expected prior to the CSH being set on the ground. Neither the split, nor the full FST, would be considered a silver

bullet in that patients would still have to be evacuated to a CSH or similar medical assets to receive further care. Both would only buy time by stabilizing a patient for further evacuation in such a case.

An area for further study stemming from this research would include, what effect did the long evacuation times have on the DOW rate for split FSTs? This was not answered in this study. To do this, the DOW rate for patients whose evacuation time was under one hour would have to be compared to those over one hour. Such a study may be able to determine if the long evacuation times have an effect on the DOW rate. Another study would be to research possible ways to reduce the evacuation times. To do this, evacuation approval procedures, flight restrictions, flight times, locations of pick up and stationing of aircraft would have to be researched. The value of this study would be to possibly improve the efficiency of air evacuation systems in Afghanistan and improve procedures that could be used in other operations. Combining the results from the two studies would set the basis for combined analysis of the evacuation times and the medical systems supporting the U.S. forces in Afghanistan. To determine the effectiveness of the system, in turn would give the statistical figures to determine if the current (as of the time the data was collected) medical foot print is providing the expected care and what additional resources are needed. Similar studies and analysis of data from the joint trauma center has been used to improve the care in Iraq and reduced the amount of medical resources being used (Nesson 2007). Other future studies of split FSTs could analyze the “burn out” of staffs to determine what workload a split FST can handle, how long shifts should be, and how long missions or tours should be at a split FST before the staff should be rotated out and replaced. Another part of the rotation study would be to

study the loss of skills. This includes not only if the patient loads fall, but also skills that the staff lose as they have a narrow mission focus and limited equipment. These questions are of importance since surgeons are highly specialized and take a long time to train, and with continuing deployments, retention of medical personnel is a concern. These questions not developed or included in this study, due to the lack of data and the time and resources that would have been needed to obtain the data to investigate these questions.

There are areas in this study that could have been approached differently. The second question, could the split FST be written into doctrine, could be approached in different ways that may make more logical sense to answer the question. Some of the approaches could have been based on the number of casualties that a split FST can treat per day. Sub-questions could have been about the effectiveness or ineffectiveness of current doctrine of the FST in the current conflicts. These changes would have made a stronger case in favor of the doctrine being changed.

Summary

This study found that split FSTs can be effective in low intensity conflicts with mature theaters, developed lines of logistical support and with units spread over large geographic areas. Because they are effective in such circumstances this study recommends that the next update to doctrine include split FSTs as a possible option for commanders to choose. Even though some current commanders recommended against such changes to doctrine, this study is recommending in favor of the change since the tendency of the Army, as a whole, is to forget the lessons learned in previous conflicts.

Prior to commanders choosing to split FSTs, they must understand the risks that are involved. These risks span across different areas. This includes the loss of all capability of the split FST by losing one key person at a split FST. Split FSTs have a decrease in surgical capacity due to being cut in half. The skills in the two parts are not the same, since one half will have two general surgeons and the other will have one general surgeon and one orthopedic surgeon. Additional diagnostic equipment may also be needed for each split FST along with the training on the additional equipment. All life support, administrative duties and security will have to be provided for the split FST. Split FSTs lack the capability to handle a surge in casualties due to decreased personnel and equipment available. Also split FSTs do not have the ability to do 72 hours of continuous operations as a full FST currently has the ability to perform. If casualty rates increase, the staff will burn out much quicker in a split FST since there is no depth of personnel. Stationing of evacuation assets has to be considered and coordinated with the aviation units since the split FST does not have true bed space and will need to evacuate patients shortly after being stabilized to a CSH that has greater capacities. These are some of the many things that the commanders must consider prior to splitting the FST. Once the FST is split, the positioning on the battlefield, in relation to other medical units, should also be considered. The collocating with level one or preferably level two medical units will allow for a synergistic relationship where the two medical units are able to assist each other and provide a greater degree of care. The collocating of a FST with a medical company is recommended and will reduce the need for additional equipment. Commanders must realize that surgeons are not the best resource to pull sick call and split FSTs should not be placed or missioned primarily for this reason. Once the

commander has considered these areas and mitigated the risks, then split FSTs could be used. To quote COL Haun, “I would not hesitate to use split FST, under similar circumstances, if it meant saving soldiers lives.” (Haun 2007)

GLOSSARY

Battalion Aid Station. The organic medical capability with in most units and is traditionally the first place that the patient is going to be seen by a doctor.

Definitive medical care. Care that will improves a patient's condition.

DOTML-PF. The concept on which changes in an Army organization are used to evaluated and synchronize capabilities in Army forces. The basic thought being that changes in any one area affects one or more of the remaining areas.

Golden hour. A term meaning if a wounded soldier can get definitive medical care within an hour of being wounded; the chances of survival dramatically increase.

Hemcon dressing. A chitosan impregnated dressing that causes clotting to stop blood loss at trauma sites of patients.

APPENDIX A

INTERVIEW QUESTIONS

I would like to ask some questions in reference to splitting forward surgical Teams (FST) for a thesis I am researching. I intend to use the information to write a paper that might be published. I would like permission to quote you. Thank you.

In your experience, were the Split FSTs effective?

What was the average time to evacuate wounded personnel to the FSTs?

If the FSTs had not been split would evacuation times been longer or shorter? In your best estimate by how much would evacuation times have changed?

What Resources (in personnel and equipment) were added to enhance the capabilities of the FSTs, if any?

Were there any other changes in employment of the FST that differed from Doctrine?

From your experience, would you use split FSTs again? If so, under what circumstances? If not, why not?

In your opinion, should doctrine be changed to support split FSTs or should it remain a commanders decision?

In your time in OEF, how many patients did the FSTs treat?

How many of patients treated by FSTs did not survive?

What is other comments do you have about split FSTs?

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